N-12® Low Head Irrigation Pipe

The thirsty West

Water resources and water rights have become one of the biggest challenges facing the western United States. Explosive population growth, in a region where water is already scarce, combined with frequent rainfall shortages, have highlighted the need for improvement to an aging and inadequate water conveyance infrastructure.

For generations, the distribution of water to arid regions of the western U.S. has been accomplished through irrigation canals and open earth ditches. As demand for water has increased, the inefficiency of these open water conveyances has become apparent. In parts of the southwest, water loss from evaporation is estimated at 100 inches per year. When the loss through infiltration is added, the problem becomes even more significant.

Enclosing these canals with pipe is one way of conserving and stretching water supplies. Up to this point, the installation of pipe for irrigation water has been difficult and cost prohibitive due to inadequate, inappropriate, or over-designed pipe.

The engineered solution

Advanced Drainage Systems has developed an innovative, cost effective pipe designed expressly to meet this growing need. **ADS N-12® Low Head pipe** provides the structural strength, joint integrity, flow capacity, flexibility and economy to serve the needs of this increasingly important market.

From "no head" to Low Head

Over the last 35 years, Advanced Drainage Systems' corrugated high density polyethylene (HDPE) pipe has been building a reputation for economy, durability and superior performance in gravity-flow, drainage applications. During the 1970s and 80s, ADS single wall pipe became the preferred product for agricultural, highway, mining, turf/recreation, and residential drainage markets.

N-12® WT Pipe

The hydraulic capabilities of single wall pipe were significantly improved in 1987 when ADS introduced N-12® pipe, the first HDPE drainage pipe combining an annular corrugated exterior for strength with a smooth interior wall for maximum flow capacity. Named for its excellent Manning's "n" rating of 0.012, N-12 pipe was designed specifically for storm sewer systems, highways, airports, and other engineered construction sites. Through extensive field and university testing, ADS engineers were able to refine the corrugated wall design for diameters up to 60" (1500mm) without compromising the pipe's excellent strength-to-weight ratio. Its performance and economy have led to rapid acceptance by contractors and engineers, and to official approvals by state and municipal agencies.

In 2001, the advancement in HDPE storm drainage pipe continued with the introduction of N-12® WT pipe, with integral water-tight bell and spigot joints. Incorporating patented technology developed in the aerospace industry, N-12 WT pipe introduced two important design innovations: (1) the sealing area of the integral bell was reinforced with a proprietary 2" (50mm) ceramic/polymer collar which improved the joint's integrity and dimensional stability, and (2) a proprietary gasket designed to maximize sealing reference and meeting ASTM F477 was factory installed onto the spigot. The result was a design that meets or exceeds ASTM D3212 lab test and ASTM F1417 water-tight field test requirements, and fills an essential role in complying with the stricter demands of new EPA water quality guidelines.

N-12® Low Head Pipe

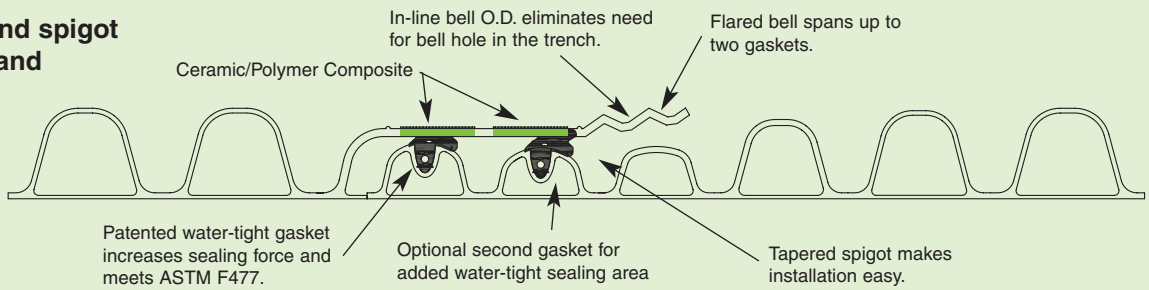
Building on the success of N-12 WT pipe, the next generation of performance in HDPE pipe has been achieved with the introduction of N-12 Low Head pipe.

ADS engineers started by modifying the integral bell joint for the irrigation market. Longer bells and spigots provide for increased joint offsets while maintaining water-tight performance.

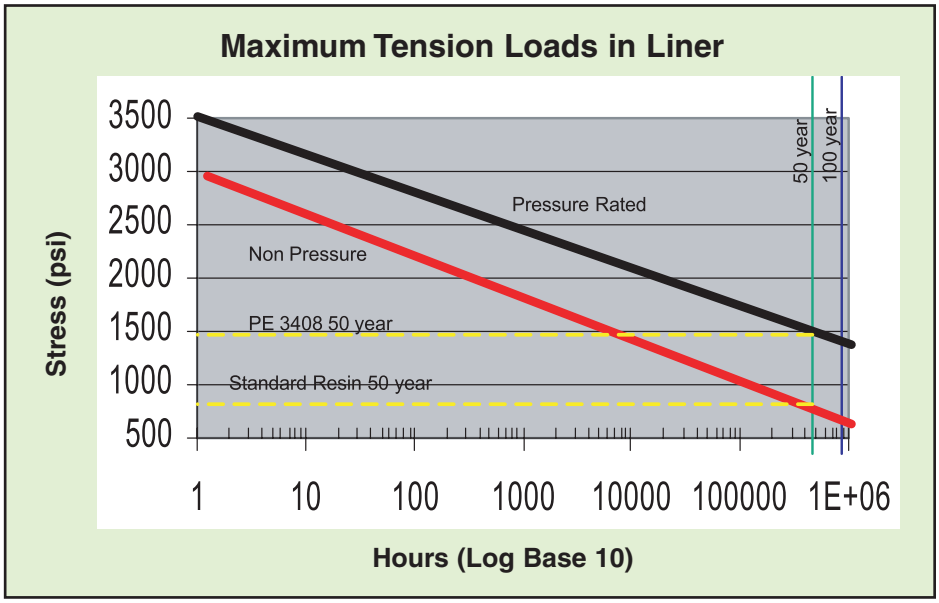
Multiple ceramic/polymer wraps are used on the longer bell to provide additional sealing area and ease of field joint assembly. The spigot has been designed with space for a second optional gasket to provide redundant sealing of the joint. These modifications provide a water-tight yet flexible joint tailored for the low head irrigation market.

In addition to joint improvements, ADS engineers designed a pipe capable of handling the pressure associated with low head irrigation. N-12 Low Head pipe is extruded with a pressure-rated resin (PE 3408) in the liner portion of the pipe. This resin is the same as that used in high pressure gas transmission throughout the country. Although not required in traditional gravity flow non-pressure drainage applications, the addition of a pressure rated resin allows continuous pressure (up to 5 psi) to be applied without detrimental long term effects.

Integral bell and spigot joint, flexible and water-tight



Affordable performance



Applications

ADS Low Head pipe can be specified for ditch enclosures for irrigation, irrigation pipe replacement, and other low head irrigation projects. The pipe is available in 30" (750mm) through 60" (1500mm) diameters, and exceeds the requirements for Type S pipe under AASHTO M294 and ASTM F2306 due to its HDB (pressure rated) resin and advanced connection design.

Structural strength

As a flexible conduit, HDPE pipe withstands vertical pressure by transferring most of the overhead load to the surrounding soil. ADS Low Head pipe will support H-25 live loads with a minimum of 12" of cover (24" for 60" pipe), an important consideration in low head pressure applications. Maximum cover will vary with design conditions, but can usually be specified up to 60 feet.

Durability

High density polyethylene is an extremely tough material that can easily withstand the normal impacts involved in shipping and installation. It is highly resistant to chemical attack, and is unaffected by soils or effluents with pH ranges of 1.5 to 14.

HDPE's ductility and molecular structure result in excellent resistance to abrasion. Polyethylene pipe shows less than 20% of the material loss of concrete pipe in abrasive environments, and is often specified for harsh mine slurries and as a slip liner for deteriorated culverts.

Hydraulic efficiency

The smooth interior of ADS Low Head pipe provides the superior flow characteristics that are essential for efficient transmission of irrigation water. Tests of ADS N-12 pipe show Manning's "n" values ranging from 0.010 to 0.013, a coefficient that is among the most efficient in the industry (it should be noted that "n" values tend to increase with slower velocities and larger pipe sizes).

Light weight

HDPE pipe is up to 30 times lighter than traditional piping products, making it far easier to transport and handle. On-site labor and equipment requirements are reduced, with a corresponding reduction in the risk of potential injury.

Fast installation

Long 6m (19' 8") lengths mean fewer joints. Joints are typically the weakest link in any low head irrigation system and should be minimized. ADS Low Head pipe joints are the best on the market, with quick and easy push-together connections made possible with our integral gasketed bell and spigot design.

Lowest installed cost of any low head irrigation pipe

The material cost of HDPE pipe is extremely competitive with other low head transmission pipe materials. When installation costs are factored in, the savings begin to multiply:

- Polyethylene's light weight cuts shipping charges.
- Fewer people are needed for on-site unloading and handling.
- Heavy equipment requirements are reduced.
- Long lengths are easy to handle and require fewer joints.
- Bell and spigot joint design reduces labor time for assembly.

Installation recommendations

Proper installation is crucial for the long term performance of any pipe structure. The basic procedures and precautions for ADS Low Head pipe are very similar to the requirements of most other pipe products.

ADS Low Head Irrigation pipe is a flexible conduit which transfers live and dead loads to the surrounding soil. Particular care is therefore required in bedding, backfill, compaction, and the selection of backfill material. Class I or II soils may be used for backfill, and should be compacted to at least 90% Standard Proctor Density.

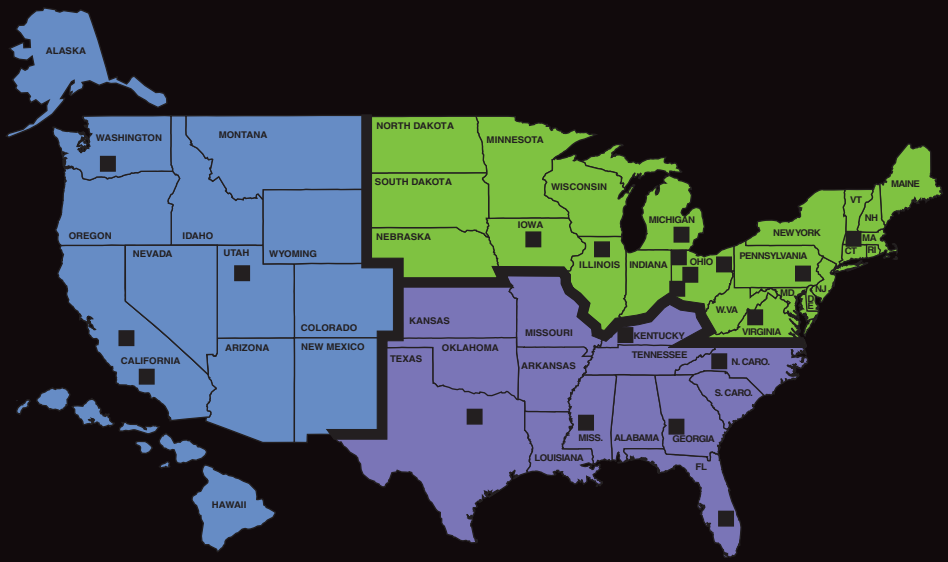
Instructions for installation of underground plastic drainage pipe are contained in ASTM D2321. Specific instructions for ADS Low Head pipe are detailed in ADS Product Note 3.115, "Installing N-12® Storm, Sanitary Sewer and Culvert Pipe".

Engineered to meet the need

ADS N-12 Low Head pipe is the only pipe designed specifically for the low head irrigation market.

- Longer bells and spigots for joint flexibility
- Multiple reinforcing wraps on bells for larger seating area
- Multiple gasket options
- Pressure rated interior liner
- Longer pipe lengths for fewer joints
- Proven toughness and durability
- Structural strength
- Hydraulic efficiency
- Light weight, easy to handle
- Fast installation
- Low installed cost

ADS Sales and Service Locations



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MANUFACTURING FACILITY LOCATIONS

For more information on N-12® Low Head Irrigation pipe, and the complete line of ADS drainage products, log on to www.ads-pipe.com, or call 1-800-821-6710.

ADS "Terms and Conditions of Sale" are available on the ADS website.

THE MOST ADVANCED NAME IN DRAINAGE SYSTEMS®

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